



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| (51) International Patent Classification ⁶ : G09F 11/02, 13/02 | A1 | (11) International Publication Number: WO 99/41729 (43) International Publication Date: 19 August 1999 (19.08.99) |
| (21) International Application Number: PCT/SI99/00003 (22) International Filing Date: 5 February 1999 (05.02.99) (30) Priority Data: P-9800044 17 February 1998 (17.02.98) SI (71) Applicant (for all designated States except US): JURJAVČIČ, Marijan [SI/SI]; Beblerjeva 10, 5280 Idrija (SI). (71)(72) Applicant and Inventor: JURJAVČIČ, Damjan [SI/SI]; Beblerjeva 10, 5280 Idrija (SI). (74) Agent: PIPAN, Marjan; Kotnikova 5, 1000 Ljubljana (SI). | | (81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> |
| (54) Title: DEVICE PROVIDING PICTURE VISIBILITY FROM ALL SIDES | | |
| (57) Abstract | | |
| <p>The invention refers to a device which provides picture of the object visibility from all sides, whereby the object exposed to view can be in the form of an inscription or picture or three-dimensional object or running inscription or mobile picture or mobile object etc. The picture is the same for all viewers standing around the device and it is presented as a high-frequency and/or true picture. The device further allows for viewing of different pictures depending on the viewer's position around the device. As a matter of fact, the device providing picture visibility from all sides, such as referred to in this invention, is a fast rotating opaque cylinder (1) discontinued lengthwise with a transparent slot (2), whereby the cylinder (1) rotates at high angular velocity around its axle together with the object (3). The transparent slot (2) is positioned in front of the object (3). Depending on the type of the viewed object (3) (two-dimensional object, three-dimensional object), the latter shall be of appropriate design, so that the picture of the object (3) is visible in the normal form.</p> | | |
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5 **DEVICE PROVIDING PICTURE VISIBILITY FROM ALL SIDES**

 The invention refers to a device which provides picture of the object
10 visibility from all sides, whereby the object exposed to view can be in the
form of an inscription or picture or three-dimensional object or running
inscription or mobile picture etc. The construction of the device depends
on the purpose of use. The picture is the same for all viewers standing
around the device and it is presented as a high-frequency and/or true
15 picture. The device further allows for viewing of different pictures
depending on the viewer's position around the device. The invention
belongs to class G 09 F 11/02 of the international patent classification.

 The technical problem successfully solved by the device in question
involves the design and construction of such device which enables high-
20 frequency and/or actual presentation of identical information in any form
(inscription, picture, three-dimensional object, running inscription, mobile
picture, mobile object etc.) from any position on the horizontal level
around the device and/or provides high-frequency, actual display of
different information in whatever form in different positions on the
25 horizontal level around the device.

The existing information media, such as advertising panels, illuminated inscriptions on walls and high buildings, LED and LCD displays and TV screens are not visible from all sides but only from a single direction from
5 a specific viewing angle.

The information media which are exposed to several sides, e.g. four-panel boards, are visible from all sides, but the viewer can also see the adjacent information medium, whereas the information is seen from the right angle from certain positions only.

10 The information media which turn around a vertical axle, e.g. two-panel, three-panel revolving boards, are visible from all sides, but the information is not simultaneously visible from all sides.

As a matter of fact, the device providing picture visibility from all sides, such as referred to in this invention, is a fast rotating opaque cylinder
15 discontinued lengthwise by a transparent slot, whereby the cylinder rotates at high angular velocity around its axle together with the object. The transparent slot is positioned in front of the object. Depending on the type of the viewed object (two-dimensional object, three-dimensional object), the latter shall be of appropriate design, so that the picture of the
20 object is visible in the desired form.

The device providing picture visibility from all sides, as referred to in this invention, will be explained in detail on the basis of the example and the pictures, whereof

- 5 **Figure 1** shows the device referred to in this invention, which provides visibility of the identical pictures of the object from all sides, as partial section and as side view;
- Figure 2** shows the device referred to in this invention, which provides visibility of the identical pictures of the object from all sides, as sections A-A and B-B;
- 10 **Figure 3** shows the diagram of the device referred to in this invention, providing picture visibility of viewed objects in the form of inscription and three-dimensional object, as partial section and side view as well as the respective ground plan;
- 15 **Figure 4** shows the diagram of the device which provides visibility of the different pictures of the object from different viewing directions, as a ground plan and with reference to display brightness in positions α_1 , α_2 , α_3 ... α_n ;
- 20 **Figure 5** shows an example of the β_1 , β_2 , β_3 ... β_n viewing angle range, whereby the viewer can see a different picture of the object at every viewing angle.

The device providing picture visibility of an object and/or of several objects from all sides and whereof the basic design is shown in Figure 3 allows for viewing of a three-dimensional object 3a (static and mobile three-dimensional object) and of a two-dimensional object 3b (inscriptions, pictures, mobile pictures, running inscription) from all sides, with high frequency, identically to all viewers around the device, whenever an opaque cylinder 1 with the object 3 rotates at high angular velocity around its axle; the transparent slot 2 lengthwise discontinuing the opaque cylinder 1 is always located in front of the object 3. The opaque cylinder 1 may be a dark and non-shiny tube with a cut-out slot 2 or a colourless transparent tube covered with a dark, opaque and non-shiny layer discontinued for the width of the transparent slot 2, or an opaque cylinder 1 discontinued by a transparent slot 2 which during the operation constantly interrupts the opaque cylinder in the way that it is constantly in front of the object 3. Such three-dimensional object 3a as well as the two-dimensional object 3b shall be appropriately shaped. The two-dimensional object 3b, if inscription or picture, must be curved to give a straight picture provided by the device. The three-dimensional object 3b must be deformed to give the desired object picture provided by the device. The curved shape and/or the deformation of the viewed object 3 depends on the distance of the object 3 from the slot 2 as well as on the purpose of the device. With the device in question, designed for remote viewing, the

objects 3 are strongly deformed, but with devices designed for viewing at short distances the objects 3 are less deformed.

The width of the slot 2 influences the quality of the picture of the object 3. With a narrow slot 2 the picture of the object 3 is sharp enough, but
5 less bright. With a wide slot 2 the situation is, however, just the opposite.

To provide a high frequency (not blinking) picture of the object it is necessary to increase the frequency of the device itself, which can be achieved by increasing the number of revolutions or by increasing the number of transparent slots and identical objects 3.

10 The objects 3 under observation may be real objects (a two-dimensional inscription 3b fixed to the structure; a three-dimensional object 3a fixed to the structure of the device) or apparent objects (object 3 as a holographic projection; object 3 is apparent, its visibility can be achieved on the optical level, with mirrors, prisms, lenses etc.).

15 The objects 3 under observation shall be bright enough. They may be well illuminated or they radiate light themselves. The brightness of objects 3 shall be a high-frequency one or constant on a micro time interval.

Figures 1 and 2 show an example of the structure of the device referred to in this invention, which consists of a fast rotating rotor, a driving unit, an
20 electric system which enables transmission of electric current to the rotor and to the housing of the device.

The rotor consists of a dark non-shiny tube with three transparent slots 2, three curved two-dimensional objects 3 with inscription, cover 10 and

11, slip rings and wires for electric current transmission to light sources 7, which makes the electric system 13 in the rotor, bearing 14, lamellas 6 and light sources 7.

The rotor is assembled in the way that the tube 1 and the two-dimensional objects 3 fit tightly into the grooves of the covers 10 and 11. The slip rings of the electric system 13, the lamellas 6 and the light sources 7 are fixed to the rotor structure, whereas the bearings 14 are pressed into the covers 10 and 11. The transparent slots 2 are positioned in front of the objects 3.

10 The rotor rotates on the axle 4 on bearings 14 and is axially blocked with a axial clamp ring 15. The rotor is driven via the shaft 5 by the electromotor 12. The shaft 5 is fixed by screw to the cover 11, whereas on the shaft of the electromotor 12 it is protected against distortion with a wedge.

15 The plate 16 is fixed by screw to the base 19. The electromotor 12, the axle 4 and the brushes of the electric system 13 are fixed by screw to the plate 16.

The protective external transparent tube 17 is mounted and fixed by screw to the housing 19 and cover 18.

20 The dark non-shiny tube 1 may be provided with cut-out slots 2 or the transparent tube is covered with a dark, opaque, non-shiny layer, discontinued for the width of the transparent slot 2.

The width of the slot 2 influences the quality of the picture of the object 3. If the slot 2 is narrow, the picture of the object is sharp enough, but its brightness is worse. With a wide slot 2 the situation is just the opposite.

The two-dimensional object 3 is illuminated by light sources 7. The
5 illumination of the object 3 may be increased by application of an internal chrome coating of the tube 1, which provides less heating of the tube 1 due to light sources 7.

Internal cooling of the device referred to in this invention, which is heated by the light sources 7, is achieved with objects 3, with boreholes 8
10 on the lower cover 10 and with boreholes 9 on the upper cover 11. The boreholes 8 are located at a different distance from the rotor axle than the boreholes 9.

The width of the visible part of the picture of the viewed object 3 is limited with lamellas 6.

15 To provide a high frequency (not blinking) picture of the inscription on the object 3, the device shall operate at sufficient frequency. In the case explained this can be achieved with three transparent slots 2, with three two-dimensional objects 3 and with a sufficiently high number of revolutions of the electromotor 12.

20 The transmission of electric current to the rotating part of the device is effected through the electric system 13, which consists of brushes, electric installation and slip rings.

The safety of the device can be achieved with a safety transparent tube 17.

Figure 4 shows the diagram of the device which allows for high-frequency display of different pictures of object viewed by viewers standing around the device. Such pictures of the objects 3 are different, depending on the viewers' positions around the device. Object 3 is the electronic display.

The electronics of the displayed object 3 - the electronic display shall operate in the way that at the angle α_1 the first column of the display S1 lights up, at the angle α_2 the second column of the display S2 lights up, at the angle α_3 the third column of the display S3 lights up, at the angle α_n ... the nth column of the display S_n lights up. Then the display is visible only in one direction and the column shall be lit for a certain time interval only. The cycle of consecutive lighting up of the first, the second ... the nth column makes up the desired picture of the object which the viewer can see as a true, non-blinking picture.

The time interval of column brightness determines the viewing angle β under which the picture of the object is still visible with reference to the original direction.

The angle β may be of different size, yet within such limits that the display can be visible as whole. By changing the viewing distance R, the viewed picture of the display becomes curved, which results in visibility of only a certain width of the display picture. The above problems can be

avoided with a sufficient angle β and a display depending on the viewing distance, whereof the consequence is a limited number of different display pictures exposed to viewing.

At viewing beyond the angle β , the viewer can see a new display
5 picture. Figure 5 shows the viewing angle ranges β_1 , β_2 , β_3 , β_n , in which the viewer can see the picture of the object 3 which may be different from every viewing angle.

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PATENT CLAIMS

1. A device providing picture visibility from all sides, which has the shape
5 of a cylinder inside which the picture of the object exposed to view is
visible, which can be in the form of an inscription or picture or three-
dimensional object or a running inscription or mobile picture or mobile
three-dimensional object, whereby the picture of the object inside the
device is the same and simultaneously visible for all viewers around the
10 device, and it is presented as a normal picture,

characterized in that

it consists of the objects (3) surrounded by an opaque cylinder (1),
lengthwise discontinued by a transparent slot (2), whereby the opaque
cylinder (1) rotates at high angular velocity around its axle together with
15 the object (3), whereas the transparent slot (2) is always located in
front of the object (3).

2. A device providing picture visibility from all sides, as referred to in claim
1,

20 **characterized in that**

the opaque cylinder (1) may be a dark and non-shiny tube with a cut-
out slot (2) or a colourless transparent tube covered with a dark,
opaque and non-shiny layer discontinued for the width of the
transparent slot (2).

3. A device providing picture visibility from all sides, as referred to in claims 1 and 2,

5 **characterized in that**

the opaque cylinder (1) is discontinued by several transparent slots (2) cut-out lengthwise and that it rotates together with several objects (3).

4. A device providing picture visibility from all sides, as referred to in
10 claims 1 through 3,

characterized in that

the two-dimensional objects (3) in the cylinder (1) shall be curved, whereas the three-dimensional objects (3) shall be duly deformed.

- 15 5. A device providing picture visibility from all sides, as referred to in claim 1,

characterized in that

the dark non-shiny tube (1) with transparent slots (2), which is fixed to the covers (10, 11), rotates, together with the objects (3) and with other
20 internal elements, at high angular velocity around a fixed axle (4) on bearings (14), whereas the rotating elements are driven via a shaft (5) and a fast rotating electromotor (12); the boreholes (8) and (9) are at different distance from the axle (4), whereas the static part of the axle

(4), the plate (16), the static part of the electric system (13), the electromotor (12) housing, the base (19) are fixed together by screws; the protective transparent tube (17) is mounted and fixed by screw to the base (19) and cover (18).

5

6. A device providing picture visibility from all sides, the picture of the object being seen only from the viewing angle, whereas outside the viewing angle another picture is visible, provided that an electronic display is used,

10

characterized in that

the electronic display operates in the way that at the angle (α_1) the first column of the display (S1) lights up, at the angle (α_2) the second column of the display (S2) lights up, at the angle (α_n) the... nth column of the display (S_n) lights up, so that the display picture is visible only in one direction from the viewing angle (β), whereas individual column shall be lit for a certain time interval only, which determines the viewing angle (β) from which the picture of the object is still visible with reference to the original direction.

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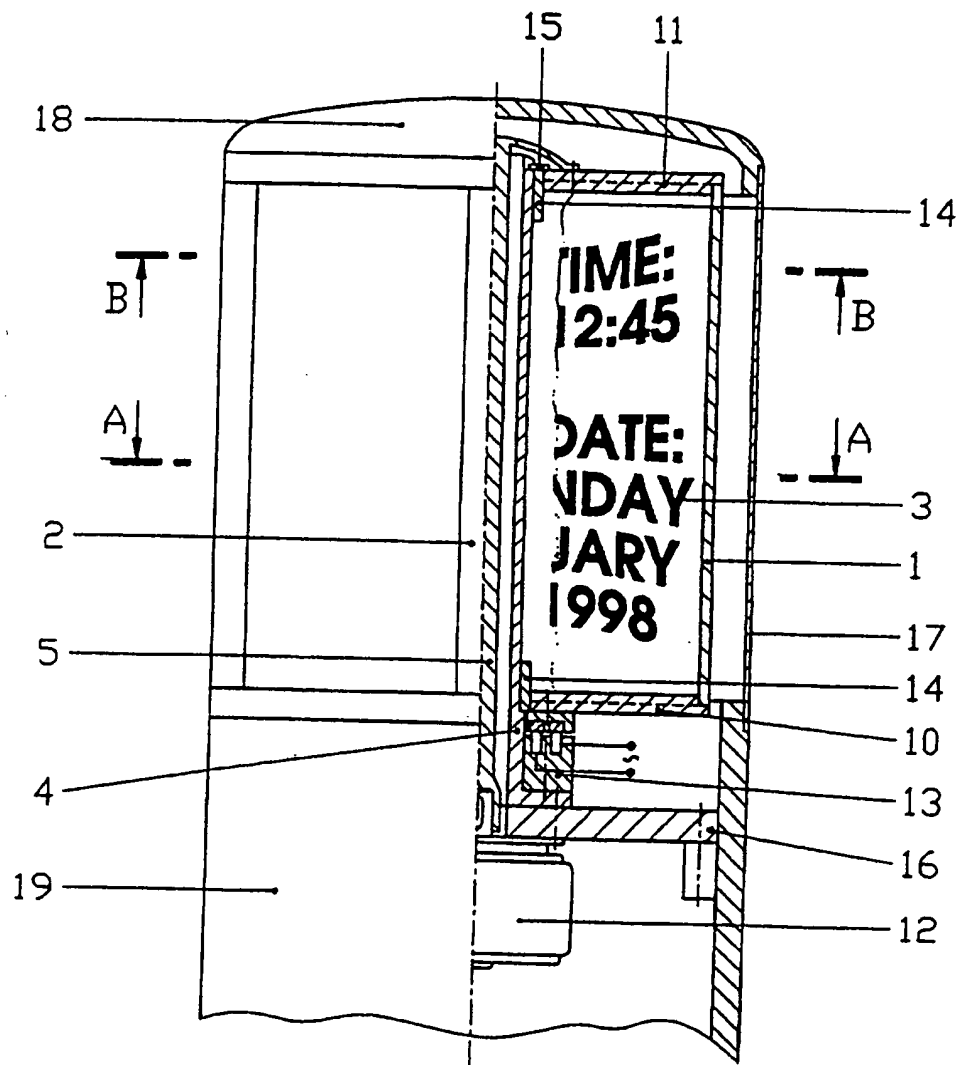


FIG. 1

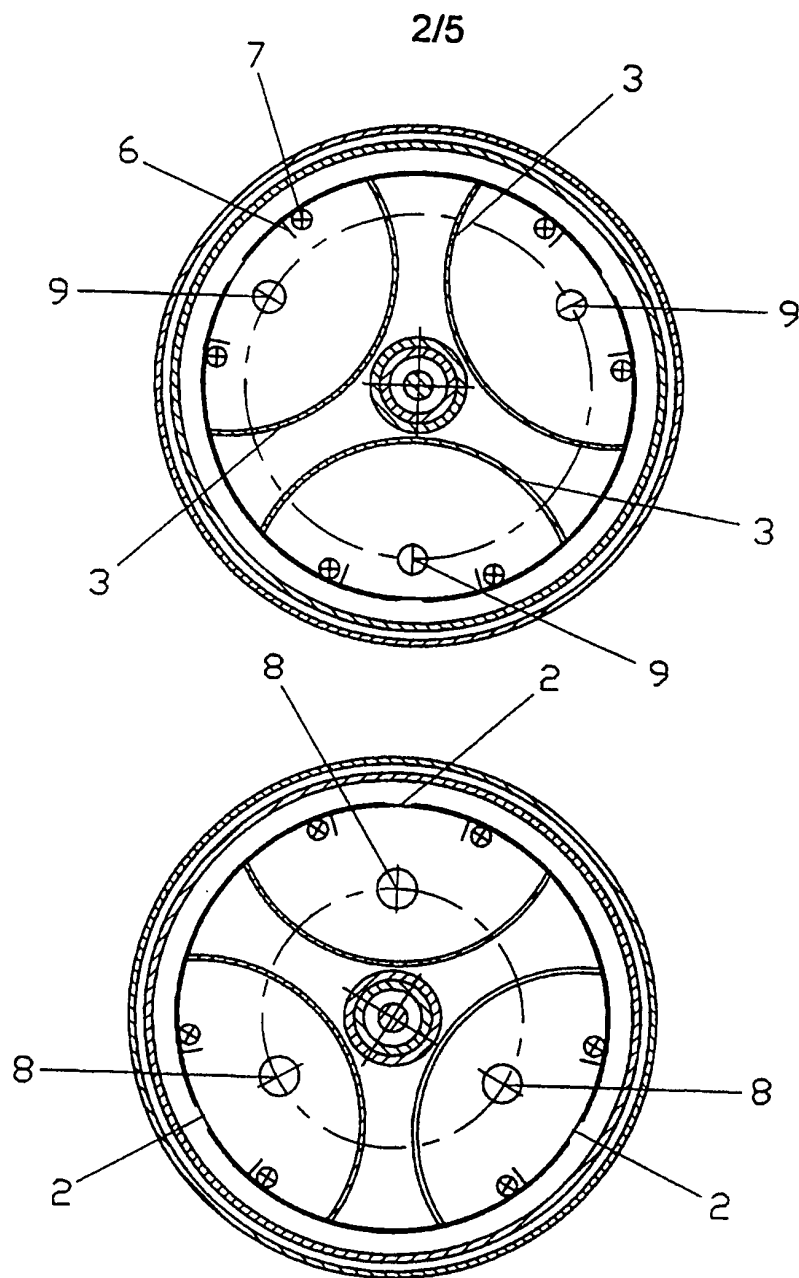


FIG. 2

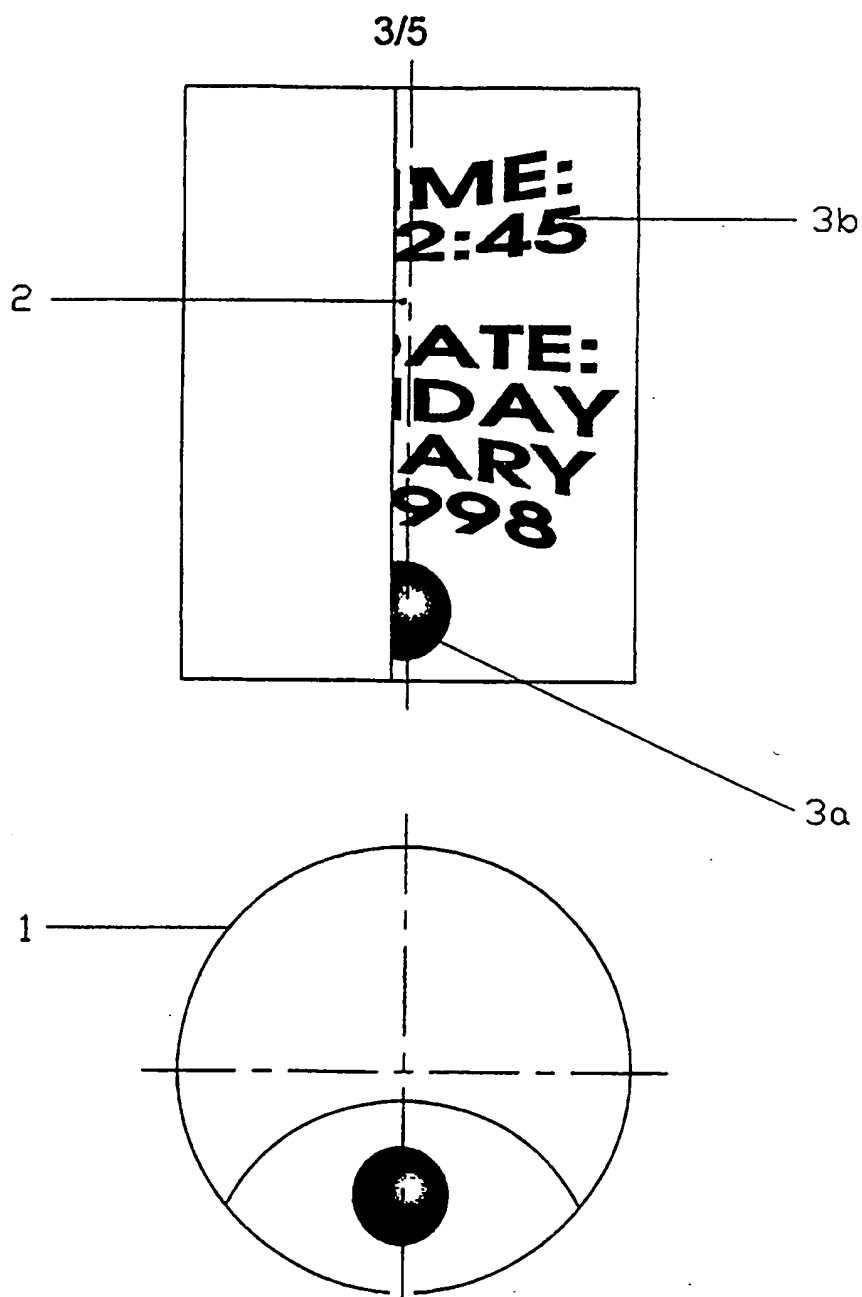


FIG. 3

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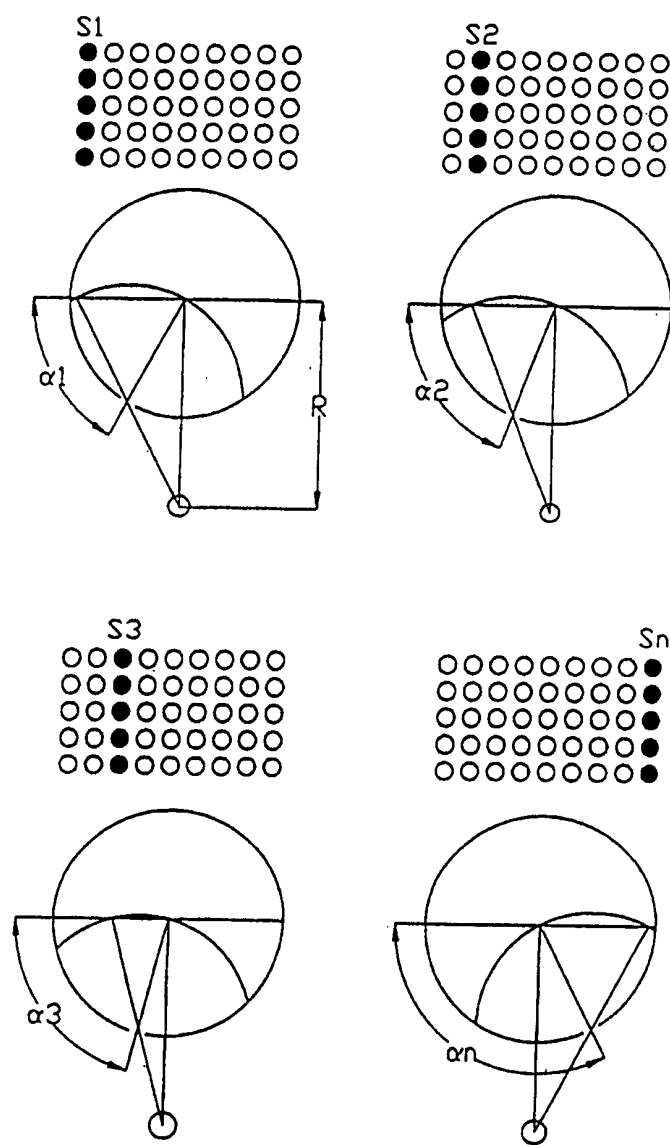


FIG. 4

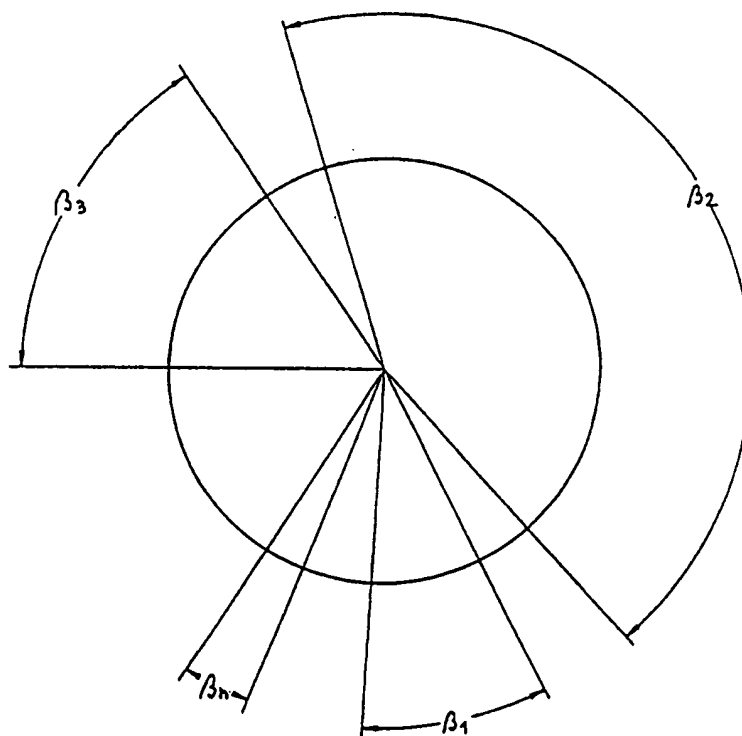


FIG. 5

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/SI 99/00003

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G09F11/02 G09F13/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G09F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| A | SI 9 300 366 A (JURJAVCIC DAMJAN) 31 December 1993 see the whole document --- | 1,6 |
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| A | EP 0 357 942 A (DEN HAAG INTERLICENSE BV) 14 March 1990 see column 6, line 45 - column 7, line 5; figure 2 ----- | 1 |

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of mailing of the international search report

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